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PATENT COOPERATION TREATY

PCT



Translation

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference B01/0610APC	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/008831	International filing date (<i>day/month/year</i>) 08 August 2003 (08.08.2003)	Priority date (<i>day/month/year</i>) 09 August 2002 (09.08.2002)
International Patent Classification (IPC) or national classification and IPC C07C 209/86		
Applicant BASF AKTIENGESELLSCHAFT		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 26 February 2004 (26.02.2004)	Date of completion of this report 08 November 2004 (08.11.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

CT/EP2003/008831

I. Basis of the report

1. With regard to the elements of the international application:*

- ☐ the international application as originally filed
- ☒ the description:
 pages 1-25, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☒ the claims:
 pages _____, as originally filed
 pages _____, as amended (together with any statement under Article 19
 pages _____, filed with the demand
 pages 1-9, filed with the letter of 25 August 2004 (25.08.2004)
- ☒ the drawings:
 pages 1/7-7/7, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item. These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP 03/08831

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-9	YES
	Claims		NO
Inventive step (IS)	Claims	1-9	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-9	YES
	Claims		NO

2. Citations and explanations

D1: DE-A-4343891

D2: DE-A-4211454.

- 1) D1, which is regarded as the closest prior art, discloses (cf. page 2, line 65 to page 3, line 9 and example) a method for producing isophorone diamine (IPDA) with cis/trans isomer ratios of both $< 73/27$ and $> 73/27$ (see table in example 1). In the method, isophorone nitrile (IPN) is hydrogenated by two-stage amination, the cis/trans ratio being manipulated through the precise control of the temperature range in each stage. The resulting reaction mixture is processed by distillation.
- 2) Therefore, the problem to be solved by the present application was that of providing an alternative method for obtaining IPDA with a cis/trans isomer ratio of $> 73/27$.
- 3) The solution proposed in claim 1 of the present application is novel over D1 (PCT Article 33(2)), since the desired isomer ratio is obtained by means of distillation at specific temperatures (a bottom temperature of 170-250°C and a top temperature of

10-90°C) and a specific pressure (20-200 mbar), the IPDA being introduced in the central zone of the distillation column. D1 provides no information with respect to the distillation method.

- 4) This solution is also inventive (PCT Article 33(3)). D1 does not teach that the cis/trans isomer ratio can be increased by distillation, but rather by decreasing the temperature in the first reactor (see table). The purification by distillation according to D1 appears to serve only to remove by-products and not to increase the portion of cis isomers.
- 5) D2 (see page 2, lines 58-62), which also relates to cis/trans IPDA mixtures, teaches that IPDA mixtures consisting of > 50% trans isomer "can be obtained using fractionating methods known to a person skilled in the art - the cis isomer boils at a higher temperature than the trans isomer - from commercially available isophorone diamine with approximately 75% cis isomer and roughly 25% trans isomer". The disclosure indicating that a cis/trans isomer mixture can be obtained by fractionated distillation with a trans isomer content of preferably 50-70% is not obvious to a person skilled in the art, nor is the idea that an IPDA isomer mixture with a cis/trans ratio of > 73/27 can be obtained by means of the distillation specified according to the amended claim 1.
- 6) Subclaims 2-9, which refer back to the main claim, can be assessed in an analogous manner.